



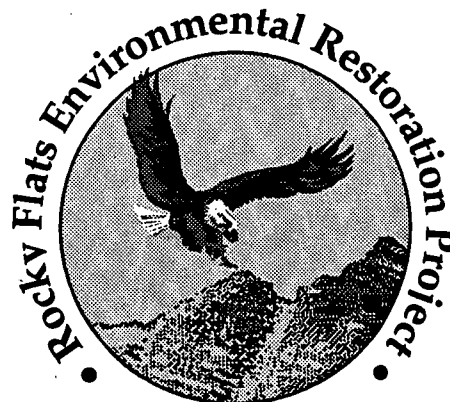
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ES&B ROCKY FLATS

Rocky Flats Plant

Environmental Restoration Program



November 1993

ADMIN RECORD

A-SW-001219

Background of Rocky Flats Plant

The Department of Energy's (DOE's) Rocky Flats Plant (RFP) is located on 6,550 acres in northern Jefferson County, Colorado at the foot of the Rocky Mountains, approximately 16 miles northwest of downtown Denver. The main production facilities are situated on 384 acres near the center of the 11 square mile site. The core plant site consists of manufacturing, chemical processing, laboratory, and support facilities where both nuclear and non-nuclear manufacturing and chemical processing for plutonium recovery have been conducted. Construction of the plant began in 1951, and production of nuclear weapons components commenced in 1952.

In 1989 many of the plant's production functions were suspended; and in 1992 the decision was made to not resume manufacture of plutonium components at RFP. RFP is now in transition to a new mission focusing on environmental restoration (ER), waste management, and decontamination and decommissioning of surplus buildings and facilities.

Geologic/Hydrologic Setting of Rocky Flats Plant

The RFP is located along the western margin of the Denver Basin approximately four miles east of the Rocky Mountains. The primary ground water-bearing units at RFP are the Rocky Flats Alluvium and the Number One Sandstone of the Arapahoe Formation. These aquifers yield limited amounts of groundwater; however, they are considered the uppermost aquifer by the regulatory agencies. Ground water contamination at Rocky Flats Plant occurs primarily in these two units. A figure showing the west to east geologic cross section through the plant is depicted in Figure 1.

Neither the Rocky Flats Alluvium nor the Number One Sandstone extends offsite from contaminated areas; hence, there is limited potential for offsite flow of contaminated groundwater. The most shallow aquifer in the Rocky Flats Plant area known to yield significant amounts of

water suitable for domestic or agricultural use is the Fox Hills Sandstone found at depths greater than 1,000 feet.

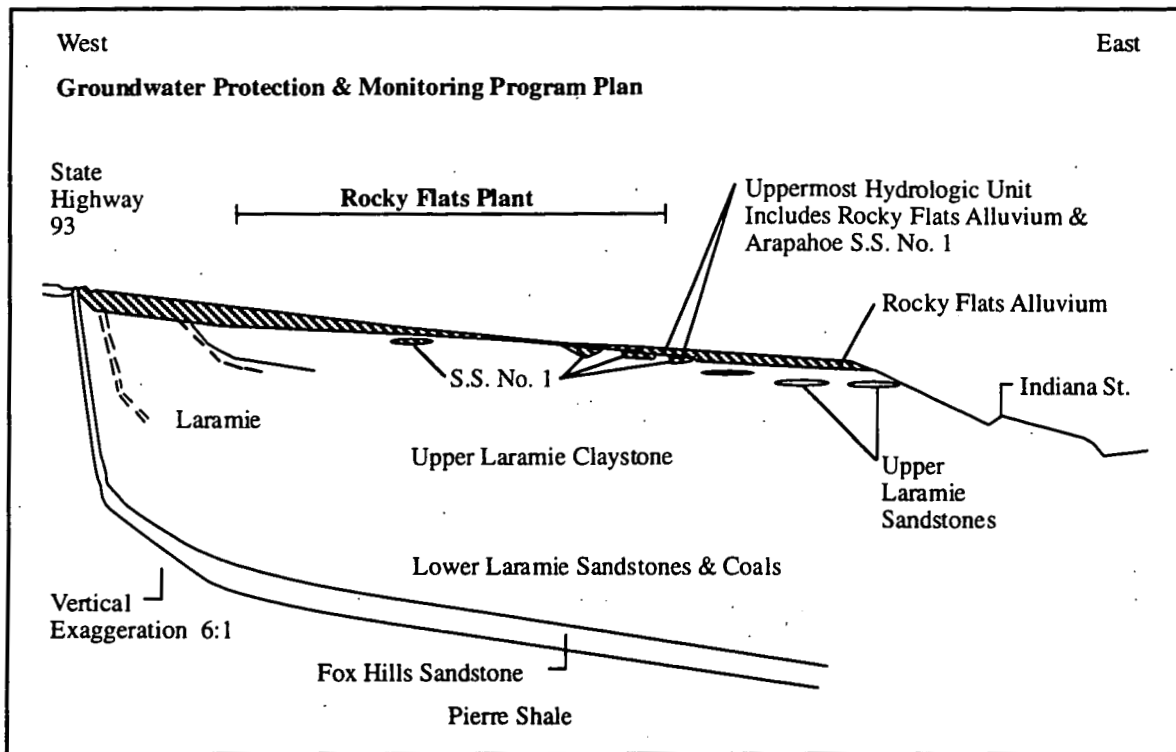


Figure 1: West to East Geologic Section of RFP

Development of the Environmental Restoration Program at RFP

Environmental Restoration activities began at RFP in 1984 under the Defense Program's Comprehensive Environmental Assessment and Response Program. The Resource Conservation and Recovery Act (RCRA) Part B permit application to the Colorado Department of Health (CDH) for ground water monitoring and closure plans was completed in 1985 and revised in 1986. A Preliminary Site Assessment Report, the first Individual Hazardous Substance Site (IHSS) list, and a sitewide characterization were completed in 1986. In 1987, the first remedial investigations of the 881 Hillside, 903 Pad, and East Trenches area, and closure investigations for the Present Landfill and Solar Ponds were

completed. A Phase II remedial investigation and a draft feasibility study for the 881 Hillside were completed and submitted to the regulatory agencies in 1988, and plans for the 881 Hillside interim remedial action facility began the following year.

In October 1989, Rocky Flats was placed on the Superfund National Priorities List (NPL). Also, the first DOE-Environmental Management (EM) Five-Year Plan was prepared in 1989 by direction of the Secretary of Energy; EM funding for the RFP Environmental Restoration Program began in 1990. In a complex-wide move in 1991, the Environmental Restoration Programs at DOE facilities, including RFP, were made Major Systems Acquisitions that placed them under the project management requirements of DOE Order 4700.1.

Interagency Agreement

In order to establish a common basis of understanding and to integrate the requirements of federal regulators with those of the CDH, an Interagency Agreement (IAG) was negotiated between DOE, the Environmental Protection Agency (EPA), and CDH and signed on January 22, 1991. The IAG establishes the legally enforceable framework at Rocky Flats Plant to facilitate coordination of environmental cleanup and oversight efforts. The IAG establishes specific milestones and time frames for remedial actions as well as penalties for noncompliance with the agreement. Because the negotiated IAG schedules for the original 268 enforceable milestones were based on limited DOE environmental restoration experience and idealized conditions, a number of assumptions regarding work activity scope, durations, and costs have proven to be incorrect. In addition, the revised mission of RFP from production to environmental restoration, waste management, and economic development requires a reevaluation of the technical approach to cleanup. Integration of Environmental Restoration (ER) activities with evolving plant actions such as Decontamination and Decommissioning (D&D) and optimum use of limited funding must be ensured. These factors have made it increasingly difficult to comply with the current IAG schedule requirements. In essence, the IAG established fixed schedules covering a period of 12 years based on a work scope that was ill defined and still evolving.

Program Organization and Major Elements

PROGRAM ORGANIZATION

During Fiscal Year 1993, the EG&G ER Program was reorganized to better address the technical, regulatory, and programmatic issues it faces. The EG&G ER Program Manager was elevated to Associate General Manager status, and the program organization was structured to focus on the critical areas of the operable units and other ER projects. The functional and project organizations are integrated with the program work breakdown structure to provide the framework for effective planning and control.

MAJOR PROGRAM ELEMENTS

In accordance with the DOE work breakdown structure for the national DOE ER Program, the RF ER Program is comprised of four major elements called summary subprojects. These elements are Remedial Action; Decontamination and Decommissioning (D&D); Program Management Support (PMS); and Treatment, Storage and Disposal (TSD) Facilities.

The Remedial Action Summary Subproject is the largest program element and is the core of the RF ER Program. It encompasses the characterization and cleanup of the 16 operable units (OUs) at RFP and the Oxnard facility in Oxnard, California; the Solar Evaporation Ponds Cleanup Project; Onsite and Offsite Surface Water Management Projects; and Sitewide Support Activities. The OU effort is governed by the IAG which identifies 177 IHSSs at Rocky Flats Plant that potentially contain radioactive, hazardous, or mixed waste contamination resulting from past operations of the plant. Onsite contaminated media includes surface and subsurface soils and water. Presence of radioactive isotopes in surface soils to the east of RFP from airborne contamination and in offsite pond sediments has been confirmed. The IHSSs are grouped by location, contaminant type, and/or relative priority into the 16 OUs. Given these factors, there is considerable overlapping of OU boundaries. CDH is the lead regulatory agency for nine of the OUs, the

EPA is lead agency for four OUs, and EPA and CDH have joint lead for three OUs.

The D&D Summary Subproject is responsible for decontaminating and/or removing surplus buildings, facilities, utilities and equipment as they are turned over to the ER Program from the RF Transition Management Program. PMS activities, made up of Program Management and Technical Support, include planning, control, and reporting of ER activities; administrative support; the administrative record; NEPA documentation; safety and health assessment; quality assurance; and community relations. The TSD Facilities Subproject encompasses the design, construction and operation of remedial support facilities to be used by more than one OU.

Progress and Major Accomplishments

IAG MILESTONES

From the inception of the RF ER Project through the end of Fiscal Year (FY) 1993, 84 enforceable milestones specified in Table 6 of the IAG were met. 62 were met on original schedule and 22 were met after extensions were granted to the original dates. An additional five enforceable milestones were extended to Fiscal Year 95 (one of which is now past due because of the stop work order), two were canceled, and two originally scheduled milestones are now past due because of the Baseline Risk Assessment stop work order.

The majority of the IAG milestones extensions have been granted to specific, individual milestones, without any consideration or extension of milestones that follow in the project schedule.

Four more FY93 milestones are expected to be missed if extensions are not granted by the regulatory agencies. These milestones are in jeopardy because of scope and cost growth, extended document review cycles, and difficulty in obtaining offsite landowner permission to

collect environmental samples. Virtually all future IAG milestones scheduled in future fiscal years will be missed under current funding projections and newly expanded work scope definitions. Funding in prior years has not kept pace with increasing scope and cost.

OPERABLE UNIT ASSESSMENT

Characterization and cleanup of the 16 OUs is the core of the ER Program at Rocky Flats. Remedial investigations of all the OUs is well underway, and feasibility studies of two operable units has started. Although, the future course of the remedial action activities for the OUs will be determined by the outcome of the aggressive strategic and integrated planning efforts now underway, DOE is committed to meeting all regulatory requirements for the cleanup of Rocky Flats.

Remedial Investigation (RI) field work for OU 1 is complete, and the 14-volume draft Remedial Investigation report was delivered to EPA and CDH on its extended milestone delivery date in early FY93. The final report will be delivered to the regulatory agencies in early FY94. The alluvial portion of the OU 2 RI field work was completed in FY92, the bedrock portion was completed in FY93, and the draft RI report will be delivered to the regulatory agencies in early FY94. The original delivery dates in the second quarter of FY92 for the draft and final OU 2 RI Report, both IAG milestones, could not be met. Because the regulatory agencies denied an extension request for this milestone and for delivery of the final OU 2 RI report scheduled for late FY93, these are considered missed milestones. The feasibility studies for OUs 1 and 2 began in FY93.

Full blown Remedial Investigation field work is underway for OUs 3, 4, 5, 6, 7, 11, and 15. Draft RI reports for four of these operable units are scheduled for completion in FY94, and the remaining three draft RI reports will be completed in FY95. Only the OU 15 RI report is scheduled to be delivered on the original IAG completion date. Work on the other seven OUs was delayed because of technical, regulatory, and/or funding issues which are discussed elsewhere in this document. The final No Further Action Justification Document for OU 16 was approved by the regulatory agencies in FY93. We are in the public comment period for the proposed plan in OU 16.

Nonintrusive RI field work for OUs 8, 9, 10, 12, 13, and 14 which are located in the RFP industrial area, where environmental and logistical conditions are similar, began in FY93 in accordance with their approved work plans. Intrusive field work in these operable units may not begin until the work is integrated with future D&D of facilities and other plant transition activities in this location. Coordination of all these activities will be addressed in the Rocky Flats integrated planning process. Early cleanup or removal actions could occur for selected "hotspots" of concentrated contamination in these OUs if the need is identified in the Industrial Area Interim Remedial Action (IA/IRA) Plan being developed. Actions under the IA/IRA Plan will protect human health and the environment and prevent migration of contamination in the Industrial Area until final remedial action is implemented.

In their review of Rocky Flats Plant's Historical Review Report, the regulatory agencies identified 81 potential areas of concern, potential incidents of concern, or areas of under building contamination not currently being addressed by RFP. Of these 81 sites or incidents, RFP has recommended that 28 potential areas of concern, two potential incidents of concern, and 12 under-building contamination sites be added to existing OUs, which will bring them under the requirements of the IAG. RFP has also proposed that 20 of the remaining sites be addressed under the existing Toxic Substance Control Act Program, and 19 sites be incorporated into building specific decontamination and decommissioning plans.

INTERIM REMEDIAL ACTIONS

The designs of Interim Remedial Action (IRA) facilities for OUs 1 and 2 incorporated comments from the public and were approved by the regulatory agencies. The OU 1 and OU 2 facilities were constructed and placed into operation in May 1991 and April 1992, respectively. The OU 1 Interim Remedial Action facility has collected and treated over one and one-half million gallons of groundwater from the 881 Hillside, and the OU 2 Interim Remedial Action facility has collected, treated, and discharged over 18 million gallons of surface water from the Walnut Creek drainage. The design of a second Interim Remedial Action for OU 2, which will evaluate vacuum-enhanced vapor extraction technology to extract volatile organics from vadose-zone soils, was approved by the

regulatory agencies in late FY93. Equipment construction and drilling at the first test site has been completed and startup is scheduled for FY94.

Solar Evaporation Ponds

The Solar Evaporation Ponds at Rocky Flats are open, outdoor impoundments that were formerly used to concentrate waste materials by evaporating excess water. Rocky Flats began to use the Solar Evaporation Ponds in the early 1950s to treat a variety of aqueous wastes; primarily process wastes containing nitrates and radionuclides, but also sewage sludge, landfill leachate, and contaminated ground water. Over the years, the ponds have been emptied, the waste concentrate disposed, and the liners refurbished several times. In spite of this maintenance, the ponds have developed leaks which has allowed an unknown amount of contaminants to migrate into the soil and ground water below the ponds. The existing ponds do not meet current requirements for surface impoundments, and DOE is closing the ponds under the RFP IAG.

During FY93, the OU 4 Solar Evaporation Ponds Subproject (SPP) was reorganized to fully integrate all four of its major elements into the Environmental Restoration Program and to strengthen the project management office. A new evaporation treatment facility dedicated to the SPP started treating contaminated ground water from below the Solar Ponds. No longer will contaminated groundwater collected by the Interceptor Trench System be returned to the ponds. Bringing this unit into operation allowed Rocky Flats to cease placing the ground water in the Solar Ponds, and allows the plant to proceed with closing the impoundments. Ponds 207A, and 207B North and Center have been emptied of sludge and waste water. A compliance plan has been prepared to return the storage pads to full RCRA compliance. These pads still store about half of the pondcrete produced in earlier years; the other half, about 9000 blocks, was shipped to the Nevada Test Site (NTS) for disposal before NTS ceased receipt of mixed wastes in 1989.

Samples from drilling beneath 207A Pond and from the surrounding area were collected and analyzed. The data will serve as the basis for upcoming decisions on how to close the ponds. Samples from 207 North and Center were taken during November 1993.

A delay of about one year from the IAG schedule had been negotiated for draft and final RFI/RI reports. The DOE, CDH, and EPA have restructured the project in a dispute resolution completed September 30, 1993. The revised plan provides for storage of Solar Ponds wastes in tanks rather than in the impoundments, consolidates reports and streamlines the administrative process for closure to achieve a 16 month acceleration of the start of closure construction from the original IAG dates.

In FY94, waste sludge and water will be removed from the Solar Ponds and stored in tanks. This activity may continue into FY95. Concurrently, the closure remedy will be selected, and the decision and proposed construction schedule will be presented for public review in an Interim Measure/Interim Remedial Action Decision Document and Environmental Assessment. Various activities to prepare the Solar Ponds site for closure will proceed to ensure prompt implementation of the closure remedy chosen.

Surface Water Management Projects

In 1989, a DOE and Cities' Working Group (the Skaggs Committee) selected two options from numerous alternatives for long-term management of surface waters generated on or passing through Rocky Flats. As a result, DOE committed to several offsite (Option B) and onsite (Option J) surface water management projects. Option B projects funded by DOE through grants to local municipalities include replacement of the drinking water supply for the City of Broomfield and construction of a catchment basin in the Woman Creek drainage for the City of Westminster. Option J projects include upgrades to environmental protection facilities on plantsite and preparation of an Onsite Pondwater Management IM/IRA Decision Document.

OPTION B PROJECTS

During FY93 on the Great Western Reservoir Replacement Project, the City of Broomfield completed its purchase of water rights from the City of Boulder and began final permitting, design, and right-of-way acquisition for the pipeline from Carter Lake to Broomfield. The final design for modifying Carter Lake outlet works was completed, and site selection, acquisition, and preliminary design for the new water treatment plant began. In FY94, the pipeline from Carter Lake to Broomfield, land acquisition, and final design for the new water treatment plant will be completed.

The cities involved in the Standley Lake Protection Project decided in FY93 to remove the diversion canal from the project because of local neighborhood opposition and Endangered Species Act constraints regarding a bald eagle nesting site next to the proposed alignment of the canal. The cities also completed a Human Health Risk Assessment (HHRA) for the construction project. In FY94, the biological assessment and final design of the project are scheduled to be completed.

OPTION J PROJECTS

Preliminary planning and scoping for the onsite pond water management IM/IRA for possible regulation of surface water ponds under CERCLA were performed in FY93. Planning for installation of water stations downstream of operable units was also completed. In FY94, construction and installation of the water monitoring stations and Pond C-2 Discharge Minimization project will be completed. Reconstruction of the South Interceptor Ditch and scope development for upgrades to the terminal ponds will begin.

Program Management

Concurrent with the organizational changes mentioned above, a concerted effort was initiated in FY93 by the DOE Rocky Flats Office (RFO) and EG&G to implement DOE Order 4700.1 to bring the RFO ER program into compliance with Major Systems Acquisition requirements. The discipline and consistency across the Program for planning, control and reporting demanded by the MSA process has already resulted in significantly improved plans which in turn result in better understanding of the Program by DOE/HQ, the regulatory agencies, and other stakeholders. Final drafts of DOE's Project Plan and working drafts of DOE's Project Management Plan and EG&G's Management Implementation Plan were completed, and implementing documents for both DOE RFO and EG&G were identified. Effort is underway for preparation of the implementing documents. A major step forward in this process was the approval of the RF ER Program Scope, Schedule and Cost Baseline by the DOE Assistant Secretary for ER on March 8, 1993.

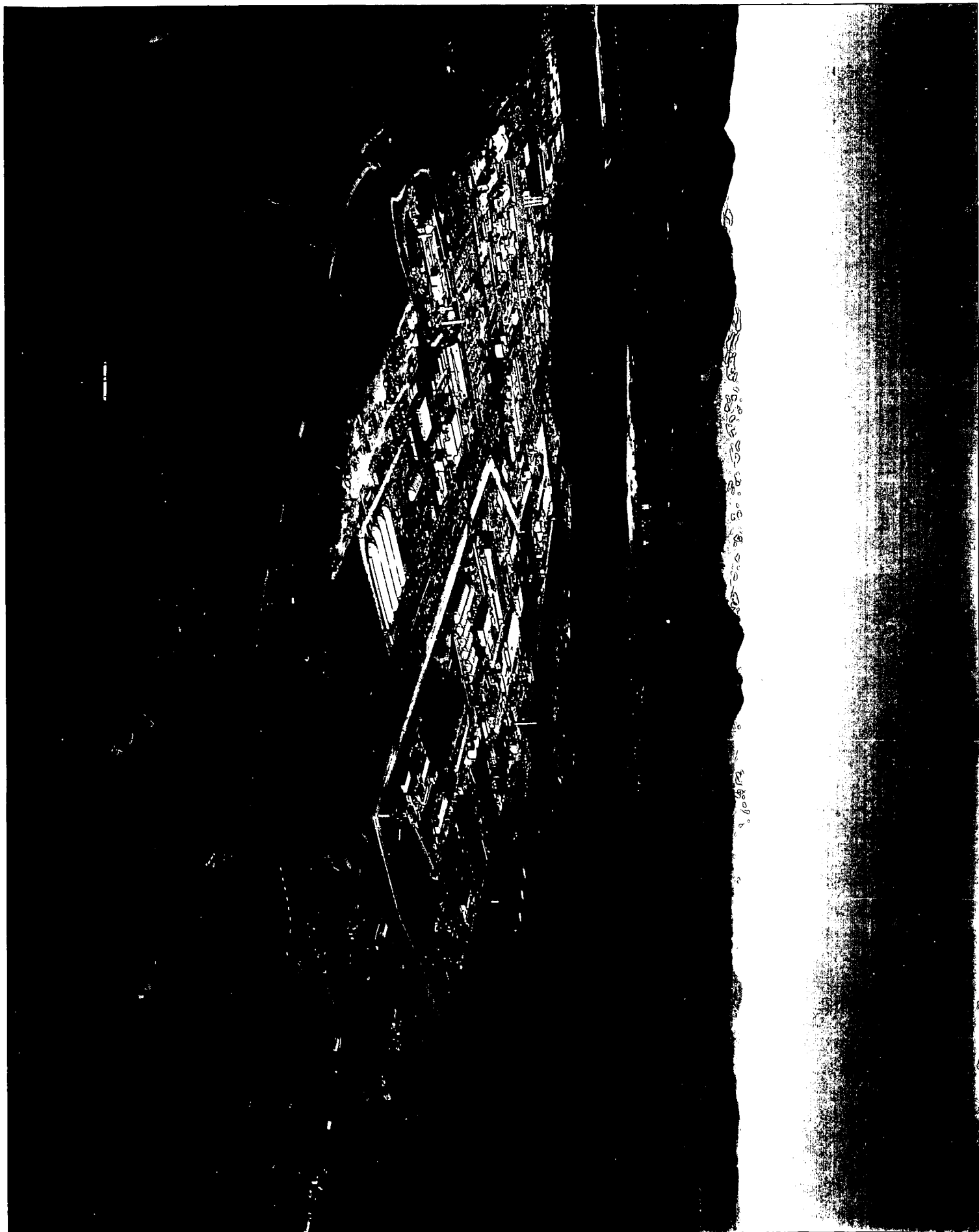
Revised Approach To Cleanup

A study effort was initiated in June 1993 to investigate the potential for a revised, accelerated approach to the Rocky Flats ER Program. The recommended revised approach which resulted builds on and integrates a number of past and current actions to improve the execution of the program, such as integrating QU boundaries, deferring work which is linked to the decontamination and decommissioning of contaminated buildings, and reducing or eliminating treatment of surface water which during the past several years has exhibited little or no contamination. The approach also incorporates recent innovative regulatory changes which encourage implementing partial cleanup solutions sooner — before completion of the more lengthy study process which by law must precede a "final" solution.

At Rocky Flats a number of these partial solutions or interim remedial actions (IRAs) could include such activities as excising or capping small contaminated areas or IHSSs which are part of a larger OU. These IRAs would be selected for their potential to reduce contamination, lower risk to the public, and accelerate physical cleanup without interfering with any ultimate larger cleanup action of the entire OU and without compromising the protection of either human health or the environment. Some of these IRAs could be initiated using the flexibility contained in the current IAG, while the entire revised approach is incorporated into a formal revision to the IAG. The net impact could be a considerably faster and potentially cheaper cleanup of Rocky Flats. This revised approach is under discussion with CDH and EPA and will be discussed with local community stakeholders before it is implemented.

Facility/Land End Use and Remediation Cleanup Levels

Current lack of a firm end use for RFP makes facility/land use planning for the site purely hypothetical and prevents an accurate estimation of risk, cost, and resource requirements associated with the ultimate disposition of the site. In addition, the lack of a firm end use introduces a great deal of uncertainty into the resource and schedule planning for environmental restoration. Cleanup standards are established on a site-specific basis using the results of site risk assessments and applicable and relevant and appropriate requirements (ARARs) determinations. As a result of the uncertainty regarding the future end use for RFP, the EPA and CDH have presumed use of the most conservative exposure scenario ("onsite residential") in the human health risk assessment required for each OU under the IAG. This scenario is intended to establish basic risk assessment assumptions regarding exposure routes, exposure times and duration, and affected populations. The regulatory agencies have also emphasized their preference that remedial action alternatives developed through the Corrective Measures Study/Feasibility Study (CMS/FS) process attain the one in one million lifetime added cancer risk (1E-6) target established in the National Contingency Plan. CDH routinely uses the 1E-6 standard as its RCRA "clean closure" performance standard. The National Contingency Plan allows agency discretion within a risk range of 1E-4 through 1-6 on a site-specific basis. If cleanup requirements and standards are based on the residential scenario, billions of dollars could be added to the cleanup costs.

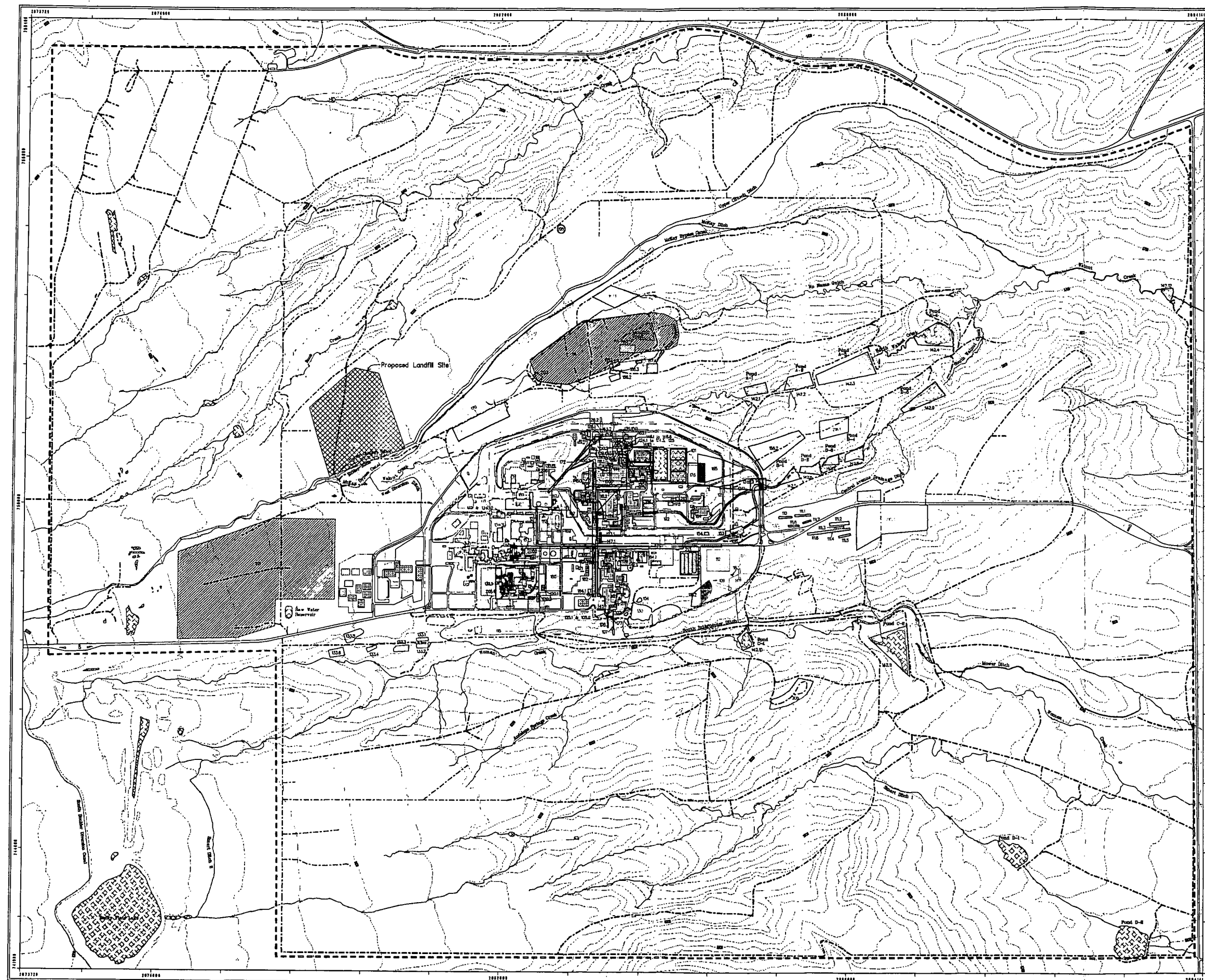


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U.S. Department of Energy
Rocky Flats Plant

**Individual Hazardous
Substance Sites by
Operable Unit**

- Paved roads
- - - Unimproved dirt roads
- Streams, ditches, and other drainage features
- Individual Hazardous Substance Sites
- - - Rocky Flats Plant boundary
- ▨ Ponds/lakes
- ▨ Buildings or structures
- Operable Unit 1
- Operable Unit 2
- Operable Unit 4
- Operable Unit 5
- Operable Unit 6
- ▨ Operable Unit 7
- Operable Unit 8
- ▨ Operable Unit 9
- Operable Unit 10
- ▨ Operable Unit 11
- Operable Unit 12
- Operable Unit 13
- Operable Unit 14
- ▨ Operable Unit 15
- ▨ Operable Unit 16

Map scale = 1 : 7200
1 inch = 600 feet

State Plane Coordinate Projection
Zone 5478

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